

**Trigonometry (Trig):**

- \*The study of triangle measurement.
- \*A way to find the length or angle measures for triangles.

**Trigonometric Ratio (Trig Ratio):**

- \*A ratio of the lengths of sides.
- \*Three most common trig ratios are
  1. Sine (sin)
  2. Cosine (cos)
  3. Tangent (tan)
- \*The ratios relate to the acute angles in a right triangle

7-4 Trigonometry

Diagram illustrating a right-angled triangle with vertices A, B, and C. The right angle is at C. The hypotenuse is the side opposite the right angle. The legs are the sides adjacent to the right angle.

Labels for the sides relative to angles A and B:

- leg opposite to angle B (side AC)
- leg adjacent to angle A (side BC)
- leg opposite angle A (side BC)
- leg adjacent to angle B (side AC)

Mnemonic: SOH-CAH-TOA

$$\sin = \frac{\text{opp}}{\text{hyp}} \quad \cos = \frac{\text{adj}}{\text{hyp}} \quad \tan = \frac{\text{opp}}{\text{adj}}$$

Formal definitions of the trigonometric ratios:

$$\sin = \frac{\text{opp}}{\text{hyp}} = \frac{\text{leg opposite of angle}}{\text{hypotenuse}}$$

$$\cos = \frac{\text{adj}}{\text{hyp}} = \frac{\text{leg adjacent to angle}}{\text{hypotenuse}}$$

$$\tan = \frac{\text{opp}}{\text{adj}} = \frac{\text{leg opposite of angle}}{\text{leg adjacent to angle}}$$

## 7-4 Trigonometry

Trig ratios will also be used to find angle measures.

Watch how you use your calculator.

**SOH-CAH-TOA**  
CHECK YOUR MODE!!!!!!

**Example 1**

Find  $\sin L$ ,  $\cos L$ ,  $\tan L$ ,  $\sin N$ ,  $\cos N$ ,  $\tan N$ . Express each ratio as a fraction and as a decimal to the nearest thousandth.

$$\sin L = \frac{8}{17}$$

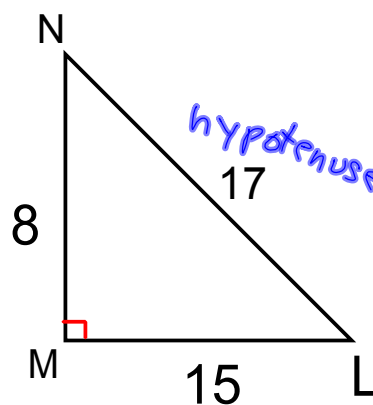
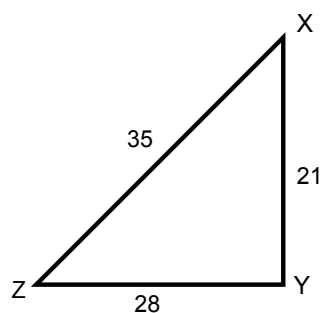
$$\sin N = \frac{15}{17}$$

$$\cos L = \frac{15}{17}$$

$$\cos N = \frac{8}{17}$$

$$\tan L = \frac{8}{15}$$

$$\tan N = \frac{15}{8}$$

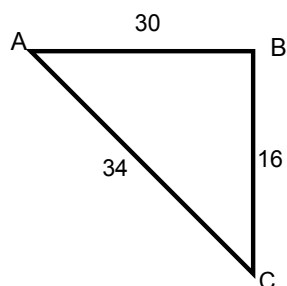
**Example 2**

Express each ratio as a fraction.

$$\tan Z = \frac{21}{28}$$

$$\sin X = \frac{28}{35}$$

$$\cos Z = \frac{28}{35}$$

**Example 3**

Express each ratio as a fraction.

$$\cos C =$$

$$\sin A =$$

$$\tan C =$$

## 7-4 Trigonometry

**Example 4:**

Find each value to the nearest ten thousandth.

a.  $\tan 56^\circ \approx 1.4826$     b.  $\cos 89^\circ \approx 0.0175$

**Example 5**

Solve for the variable

A.)  $\sin B = 0.4848$

$$B = \sin^{-1} 0.4848 \approx 29^\circ$$

B.)  $\cos W = 0.6157$

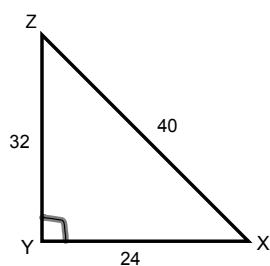
$$W = \cos^{-1} 0.6157$$

$$W \approx 51.99^\circ \text{ or } 52^\circ$$

C.)  $\tan x = 0.5317$

$$x = \tan^{-1} 0.5317$$

$$x \approx 27.99^\circ \text{ or } 28^\circ$$

**Example 5**

Find each angle measure and round to the nearest hundredth.

$$\sin X = \frac{32}{40}$$

$$X = \sin^{-1}\left(\frac{32}{40}\right)$$

$$X \approx 53.13^\circ$$

$$\sin Z = \frac{24}{40}$$

$$Z = \sin^{-1}\left(\frac{24}{40}\right)$$

$$Z \approx 36.87^\circ$$